The performance of four possible rules for selecting the Prime Minister after the Dutch Parliamentary elections of March 2017

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Abstract

Economic policy depends not only on national elections but also on coalition bargaining strategies. In coalition government, minority parties bargain on policy and form a majority coalition, and select a Prime Minister from their mids. In Holland the latter is done conventionally with Plurality, so that the largest party provides the chair of the cabinet. Alternative methods are Condorcet, Borda or Borda Fixed Point. Since the role of the Prime Minister is to be above all parties, to represent the nation and to be there for all citizens, it would enhance democracy and likely be optimal if the potential Prime Minister is selected from all parties and at the start of the bargaining process. The performance of the four selection rules is evaluated using the results of the 2017 Dutch Parliamentary elections. Plurality gives VVD. VVD is almost a Condorcet winner except for a tie with 50Plus. Borda and BordaFP give CU as the prime minister. The impossibility theorem by Kenneth Arrow (Nobel memorial prize in economics 1972) finds a crucially different interpretation.

Introduction

This present text is much like the earlier texts in Colignatus (2006), (2010b) and (2012), and the main differences are the party seats in the House of Commons in Dutch Parliament. The elections were on March 15 2017 and the data on the seats are not official yet.

PR vs DR

The 2017 Dutch general elections generated much attention in the world because of the position of populist Geert Wilders, against the backdrop of Brexit and the election of US President Donald Trump. Let us hope that the (scientific) world also takes a close look at the Dutch electoral system. This system has proportional representation (PR) with a threshold of 1 seat in a 150 seat House of Commons, or 0.67% of the vote. The lack of districts and the low threshold cause openness and responsiveness to voters. At these elections, voters had a choice between 28 parties, and indeed 1 party (FvD) entered Parliament anew and 1 other party (DENK) that had split up from an existing party received voter approval. The Dutch system has shown robustness against the populist challenge in the last decades, by absorbing social tensions and forcing populists to participate in the parliamentarian process.

In countries like the US or the UK, there is district representation (DR), and this favours the existence of two or perhaps three parties, with less need for the formation of coalitions. The system of

districts apparently dates from the 18th and 19th centuries when simple methods were used to select delegates. Districts still arise naturally as for example the various nations in the European Union. In Holland there is proportional representation (PR) and this allows a wider spectrum of opinions and parties, and thus a greater need for coalitions. A comparison of the United Kingdom 2010 and The Netherlands 2006 can be found in Colignatus (2010a).

PR seems an advantage for democracy but the cost of PR is that the parties must bargain to create a coalition government. What voters must figure out for themselves in the US and UK, this now is called “bargaining”, and is done by political professionals in the open, with the bonus that parties must show tolerance for different opinions. Given the apparent advantages of PR it is interesting what we can learn about coalition formation.

Majority or mirroring

Colignatus (2001, 2007, 2011, 2014) "Voting Theory for Democracy" (VTFD) suggests that a government "mirrorring" Parliament would tend to be optimal, i.e. that most parties would be represented in the government. This would be PR not only in Parliament but also in government (the cabinet). In that case the Prime Minister has the role of the chairperson and facilitator rather than the ideological leader. This also means that the issue on policy making could be rather distinct from the selection of the Prime Minister. In current practice, the choice on the Prime Minister tends to be conditional on agreements on policy. Such bargaining on policy might cause that a coalition is formed in which the largest party in the House of Commons does not partake, and then the largest party in that coalition (but not in the House) would conventionally select the Prime Minister.

After elections for the House, the Dutch convention has a two-staged process. In the first stage the party with the greatest number of votes leads the efforts to form a coalition government ("informateur"). In the second stage it is assumed that a majority coalition has been found, and the party with the greatest number of seats in that majority coalition selects the Prime Minister ("formateur"). On March 15 2017 the Dutch had general elections for the House of Commons. The highest score was for the VVD with 33 seats in a House of Parliament of 150, only 21% of the vote. This does not seem like a strong base to select a Prime Minister. However, the VVD might forge a coalition that has only a little bit more than 50% in the House and Senate. Then Mark Rutte, the leader of the VVD, would continue to be Prime Minister.

Four selection rules

Given the suggestion of a government mirroring Parliament, there is room to consider the selection process of the Prime Minister as a separate factor apart from policy bargaining. A better separate selection process of the Prime Minister could enhance the political base of the whole coalition. The Dutch current method of selection is an application of the **Plurality** voting rule (using the criterion of the greatest number of seats). Other ways to select the Prime Minister considered here are the **Condorcet** rule, the **Borda** count, and their combination the **Borda Fixed Point** method. When we better understand their performance then eventually the House might decide to use another method than current Plurality to select the politician to lead the efforts to form a coalition government.

The various approaches are mentioned by Saari (2001), "Decisions and elections", except for the Borda Fixed Point method. In his preface, Saari sighs: "I know that you messed up on some decisions. I sure have." There still is a case to be made for suitable election methods. However, the Dutch system of PR with a threshold of 1 seat itself seems to be the best, and the issue of looking

for better voting methods seems to be primarily an issue for the professionals, i.e. the Members of Parliament.

This present paper evaluates the performance of those for mentioned selection rules. The results of the Dutch elections provide a testing ground. An earlier analysis along the same lines is Colignatus (2006), (2010b) and (2012) on the elections in those years. A new point of attention in 2012 was that the coalition also must have a majority in the Senate. A new point for the 2017 elections might be the pitfall of *opposition by losing parties*. Dutch Labour (PvdA) went from 38 seats in 2012 to 9 seats in 2017, which is a loss of 19% points, which is unprecedented in Dutch elections. Conventional political strategy suggests that they now opt for opposition, to lick the wounds, and to recuperate by collecting voter discontent in the coming years. My impression is that Labour now better tries to remain in government, keep Jeroen Dijsselbloem (PvdA) as minister of finance, and regain a better position from continuing in government.

Foreign readers will hopefully not mind that this discussion uses the local letter soup. The CDA, CU and SGP are Christian parties. The VVD is the party of former EU commissioner Frits Bolkestein, and they are EU-sceptic neoliberal-conservatives, though actually pro-EU compared to Geert Wilders (PVV) who wants Holland out of the EU and euro (Nexit). FvD wants the same as PVV but under a different leader. Pro-EU neoliberals are D66. Leftist are PvdA (Labour, pro-EU social democrats), SP (anti-EU socialists), and GL (the Greens). 50Plus is a one-issue party for the elderly. PvdD is the party for protection of animals, also quite worried about climate change. DENK has leaders with an immigrant background who protest against the abuse of immigrants and who tend to support Turkish president Recep Erdogan.

Summary of results for 2017

If the parties had provided their rankings, then we could determine other kinds of results. In the lack of these data, this paper uses my guesstimate.

Plurality is the simplest scheme, and parties vote for their own candidate. As said, here VVD wins.

With Borda rankings, the CU is the winner.

The VVD is almost the Condorcet winner - i.e. it tends to win all pairwise votes, except for a tie with 50Plus. For example, in pairwise voting CU loses from VVD.

The Borda system of preference ranking has some drawbacks. In fact, Condorcet presented his method since he was critical of the Borda count. Pairwise voting however is notoriously unstable too. In many elections there is no Condorcet winner, leaving one with the question what to do next. Being a Condorcet winner is not necessarily the best condition. The Borda Fixed Point also takes account of the rank position.

The overall best election mechanism very likely is the Borda Fixed Point, see Colignatus (2001, 2007, 2011, 2014). This was developed with a somewhat different line of reasoning but it can be seen as a compromise between Borda and Condorcet.

For 2017 the Borda Fixed Point method selects the CU.

CU has only 5 seats in a Parliament of 150 but apparently it has a strategic position. A 2017 surprise is that Marianne Thieme (PvdD, Party for the Animals) went from 2 to 5 seats, and gained a second position in the Borda count. However, current prime minister Mark Rutte (VVD), Plurality winner with the greatest number of votes and seats (33), comes in third place in the overall Borda ranking. Potentially, members of the Dutch House of Parliament might think that Mark Rutte might

still be the best prime minister because of his greater international experience, and actually vote for him (if we had their true rankings).

Structure of this paper

The structure of the discussion below is straightforward. We enter the new voting results, guesstimate the party preferences, and apply the different voting mechanisms.

Appendix A investigates whether the VVD can affect this outcome by voting strategically. Other parties might try to block that stategy. **Appendix B** looks at the situation for the Senate. **Appendix C** has some residual comments on coalition formation. Political parties show curious swings in position and perhaps they might be helped with professional advice on consistency in what they want. Perhaps smart-phones can use an "app" with a political backbone generator to help political leaders at crucial moments.

The paper is embedded in *Mathematica*, a system for doing mathematics on the computer. This may make for a perhaps untraditional format of this paper, with hidden program code and input and output sections. See Colignatus (2003) and the website on The Economics Pack.

PM 1. To repeat: this calculation is based upon my own guesstimate of the rankings by parties.

PM 2. Colignatus (2006), selected Rouvoet (CU) as Prime Minister instead of Balkenende (CDA) who was appointed in the conventional manner. Colignatus (2010b) showed that CU (Rouvoet) again became the winner. The CU won again in 2012 and now again in 2017. This need not say much, since I have been using my guesstimates of the rankings and not the true rankings given by the parties themselves.

PM 3. Stokman et al. (2012) is a discussion in Dutch about the major possible coalitions, using an innovative scheme on these various party programs and seats. This present paper does not delve deep into such formation of the coalition. The issue may be mentioned however since it clarifies the utility of a more independent selection of the Prime Minister. Clearly the formation of a coalition is a tedious matter but it seems that the process could be simplified by using information on the preferences for the selection of the Prime Minister. This present paper concentrates on the more traditional issue of the voting mechanism to select the Prime Minister.

PM 4. The book "Voting theory for democracy" (VTFD) was reviewed in 2011 in "Voting Matters". The reviewer only read half of the section on the BordaFP method and gave a misrepresentation of it. See VTFD 4th edition of 2014 for a discussion.

Data

The outcome in March 2017 for a House of Parliament with 150 seats:

```
Parties = {{CDA, 19}, {CU, 5}, {D66, 19}, {GL, 14}, {PvdA, 9}, {PvdD, 5}, {PVV, 20},
   {SGP, 3}, {SP, 14}, {VVD, 33}, {"50Plus", 4}, {DENK, 3}, {FvD, 2}} // Sort;

Items = First /@ Parties;

NumberOfItems = Length[Items];
```

```
vlis = Last /@ Parties;
NumberOfVoters = Length[vlis];
```

The voting weights are fractions of 1.

```
Votes = vlis / Add[vlis];
```

```
shares = NRoundAt[ Votes, 2];
```

```
{Items, vlis, shares} // Transpose
```

50Plus	4	0.03
CDA	19	0.13
CU	5	0.03
D66	19	0.13
DENK	3	0.02
FvD	2	0.01
GL	14	0.09
PvdA	9	0.06
PvdD	5	0.03
PVV	20	0.13
SGP	3	0.02
SP	14	0.09
VVD	33	0.22

In Voting Theory, a deadlock may cause that the Status Quo persists. Since deadlocks can be frequent, the notion plays an important role. For the present discussion the Status Quo is just the first of the list of items, and it might be reset for a particular purpose.

```
StatusQuo[]
```

50Plus

Coalitions

Liljedahl (1995): “Many political assemblies are divided along party lines where each party usually vote[s] as an unit. It is widely recognized that the power a party then can hold is not proportional to its number of representatives but rather to the number of winning coalitions it can create, the Banzhaf index. The index for a party is thus a count of the situations in which the party can tip the balance one way or the other.”

Using Liljedahl’s computer package for the calculations we can find how many coalitions each party might block.

```
BanzhafLiljedahl[Parties]
```

50Plus	178
CDA	1072
CU	232
D66	1072
DENK	106
FvD	66
GL	760
PvdA	404
PvdD	232
PVV	1138
SGP	106
SP	760
VVD	2246

However, the parties are arranged in an ideological space. Some may be extreme opposites and not be found in a single coalition. If this space is reduced to a single line going from (political) left to right, then we may conjecture the following (my guesstimate).

```
spectrum =
  {SP , GL , PvdA , D66 , PvdD , "50Plus", CU , CDA , VVD, PVV, FvD, SGP, DENK};
```

The following coalitions have the target to minimize the majority.

```
coalshouse = MinimalCoalitions[Parties, spectrum]
```

{SP, GL, PvdA, D66, PvdD, 50Plus, CU, CDA}	89
{GL, PvdA, D66, PvdD, 50Plus, CU, CDA, VVD}	108
{PvdA, D66, PvdD, 50Plus, CU, CDA, VVD}	94
{D66, PvdD, 50Plus, CU, CDA, VVD}	85
{PvdD, 50Plus, CU, CDA, VVD, FvD, PVV}	88
{50Plus, CU, CDA, VVD, FvD, PVV}	83
{CU, CDA, VVD, FvD, PVV}	79
{CDA, VVD, FvD, PVV, SGP}	77

Some parties however have positions that tend to exclude them from coalitions. SP announced to block a coalition with VVD. It will be difficult to form a coalition with 50Plus since it wants to reduce the retirement age to 65 again, even though it seems somewhat of a middle of the road party. The coalitions with the PVV in it are less likely. The 2010 coalition by CDA & VVD & PVV was broken by PVV, and VVD blocks the PVV (perhaps also because of the good experience of governing with PvdA). DENK is regarded as supporters of president Erdogan of Turkey. Thus, a more relevant order is:

```
spectrumRelevant =
  {SP , GL , PvdA , D66 , PvdD , CU , CDA , VVD, FvD, SGP, "50Plus", PVV, DENK};

coalshouse = MinimalCoalitions[Parties, spectrumRelevant]
```

{SP, GL, PvdA, D66, PvdD, CU, CDA}	85
{GL, PvdA, D66, PvdD, CU, CDA, VVD}	104
{PvdA, D66, PvdD, CU, CDA, VVD}	90
{D66, PvdD, CU, CDA, VVD}	81
{PvdD, CU, CDA, VVD, FvD, SGP, 50Plus, PVV}	91
{CU, CDA, VVD, FvD, SGP, 50Plus, PVV}	86
{CDA, VVD, FvD, SGP, 50Plus, PVV}	81

The coalition with 104 seats would probably best mirror Parliament as far as acceptable to major parties, and it would allow Parliament to focus on its role of checking the executive power.

An alternative approach is to first select the Prime Minister and then form a coalition government that mirrors Parliament.

Hypothesis

The statement of full preference orderings is a bit too complicated for the individual ballot box. However, the method can be used in the House by the Members.

The mathematical routines require party preference rankings on the selection of particular items. In this case we are looking at candidates for Prime Minister. We presume that each party can present a candidate and then the Members of the House enter their orders of preference on the candidates. These preferences should best expressed not by the parties but by the individual Members of Parliament, but here we assume that Members vote along a party line.

Parties might increase their chances by proposing candidates that are well received by other parties. It is simplest to presume that their candidates will be the leaders at the elections.

(NB. An alternative is to allow parties to present more candidates, proportional to the size of the party. A big party might present both its leader plus some compromise candidates. However, since such compromise candidates might diminish the value of the leader, this is a less likely approach.)

It is advisable that parties in the House (or rather MPs themselves) express their preference orderings. Lacking these, I give my own guesstimate. It may be noted that parties will adapt their preference orderings in the bargaining process, when parties drop policy aims and compromise. This aspect cannot be reproduced here.

The following guesstimate associates with above left-to-right scale but I inserted some modifications. For example, PVV has made itself quite unpopular. For example, 50Plus is a one-issue party and hence would be ideologically neutral, yet, parties on the right have a stronger dislike of one-issue parties and may percieve it as leftist too. In Holland, there is an important tension between CDA and D66 because of euthanasia.

```
Pref[CDA] = {CDA > CU > VVD > PvdD > PvdA >
     GL > SP > SGP > "50Plus" > D66 > PVV > FvD > DENK};
Pref[CU] = {CU > CDA > SGP > PvdA > "50Plus" > GL >
     SP > VVD > PvdD > D66 > PVV > FvD > DENK};
Pref[D66] = {D66 > PvdA > "50Plus" > GL > VVD > PvdD >
     CU > SP > CDA > SGP > PVV > FvD > DENK};
Pref[GL] = {GL > SP > PvdD > PvdA > "50Plus" > D66 >
     CU > CDA > VVD > SGP > PVV > FvD > DENK};
Pref[PvdA] = {PvdA > GL > PvdD > D66 > SP > "50Plus" >
     CU > CDA > VVD > SGP > PVV > FvD > DENK};
Pref[PvdD] = {PvdD > "50Plus" > D66 > GL > CU > SP >
     PvdA > CDA > VVD > SGP > PVV > FvD > DENK};
Pref[PVV] = { PVV > FvD > VVD > CU > CDA > PvdD > SGP >
     SP > PvdA > "50Plus" > D66 > GL > DENK};
Pref[SGP] = { SGP > CU > CDA > PvdD > VVD > PVV > FvD >
     SP > PvdA > "50Plus" > GL > D66 > DENK};
Pref[SP] = {SP > GL > PvdA > "50Plus" > PvdD > D66 >
     CU > CDA > VVD > SGP > PVV > FvD > DENK};
Pref[VVD] = {VVD > CDA > CU > D66 > PvdD > FvD > PvdA >
     SGP > "50Plus" > GL > SP > PVV > DENK};
Pref["50Plus"] = {"50Plus" > D66 > PvdD > CU > PvdA >
     GL > SP > CDA > VVD > SGP > PVV > FvD > DENK};
Pref[FvD] = {FvD > PVV > "50Plus" > VVD > CDA > CU >
     D66 > PvdD > PvdA > SGP > GL > SP > DENK};
Pref[DENK] = {DENK > "50Plus" > SGP > VVD > CDA > CU >
     D66 > PvdD > PvdA > GL > SP > PVV > FvD};
```

These preference patterns can be translated in Borda ordinal preference scores. A high score is a high preference.

```
Preferences = PrefToList[ToPref @@ Pref[#]] & /@ Items
```

$$\begin{pmatrix} 13 & 6 & 10 & 12 & 1 & 2 & 8 & 9 & 11 & 3 & 4 & 7 & 5 \\ 5 & 13 & 12 & 4 & 1 & 2 & 8 & 9 & 10 & 3 & 6 & 7 & 11 \\ 9 & 12 & 13 & 4 & 1 & 2 & 8 & 10 & 5 & 3 & 11 & 7 & 6 \\ 11 & 5 & 7 & 13 & 1 & 2 & 10 & 12 & 8 & 3 & 4 & 6 & 9 \\ 12 & 9 & 8 & 7 & 13 & 1 & 4 & 5 & 6 & 2 & 11 & 3 & 10 \\ 11 & 9 & 8 & 7 & 1 & 13 & 3 & 5 & 6 & 12 & 4 & 2 & 10 \\ 9 & 6 & 7 & 8 & 1 & 2 & 13 & 10 & 11 & 3 & 4 & 12 & 5 \\ 8 & 6 & 7 & 10 & 1 & 2 & 12 & 13 & 11 & 3 & 4 & 9 & 5 \\ 12 & 6 & 9 & 11 & 1 & 2 & 10 & 7 & 13 & 3 & 4 & 8 & 5 \\ 4 & 9 & 10 & 3 & 1 & 12 & 2 & 5 & 8 & 13 & 7 & 6 & 11 \\ 4 & 11 & 12 & 2 & 1 & 7 & 3 & 5 & 10 & 8 & 13 & 6 & 9 \\ 10 & 6 & 7 & 8 & 1 & 2 & 12 & 11 & 9 & 3 & 4 & 13 & 5 \\ 5 & 12 & 11 & 10 & 1 & 8 & 4 & 7 & 9 & 2 & 6 & 3 & 13 \end{pmatrix}$$

PM. The party preferences might be used to indicate their potential coalitions, instead of the overall left-right spectrum. Comparing these might generate a better list of possible overall coalitions. But this may also create a false sense of accuracy.

We store this key voting problem, so we can look at variants and restore.

```
VotingProblem["Store"];
```

Relation to Arrow's impossibility theorem

Arrow (1951) showed that five axioms resulted into a contradiction. He suggested that these axioms were reasonable and morally desirable for a democracy and he concluded to an impossibility of such (ideal) democracy. This approach has dominated the literature since then. Some economists expressed a preference for dictatorship. Here we take a different approach. It is reasonable and morally desirable *that a process works*. An impossibility thus is not reasonable and not morally desirable. Hence we have to drop one of Arrow's axioms. For example, a tie can be broken by the chairperson or a flip of a coin. Arrow's axioms require always the same outcome and thus cannot deal with those time-dependent tie breaking rules. The key insight is this: We can make a distinction between voting and deciding. For voting outcomes it is reasonable that there are preference cycles but when we decide on a tie then we use a tie breaking rule. For decision making we drop the axiom of independence of irrelevant alternatives. This axiom is better labelled as the axiom of pairwise decision making. We don't decide using only pairs and the limited information that they provide but we use all information provided by the whole voting field. In this approach, the Borda Fixed Point (BordaFP) is likely to be seen by many as the best selection method. Alternative methods tend to have too many drawbacks. See VTFD (Colignatus (2001, 2007, 2011, 2014)) for a longer discussion, or Colignatus (2011) for a shorter one. Here we can evaluate the performance of the options of Plurality, Borda, pairwise or Condorcet, and BordaFP. PM. Approval voting has some popularity in academic circles but see Colignatus (2005).

The Borda Fixed Point (BFP) selection

Given the above data and assumptions, the Borda Fixed Point algorithm determines the fixed point, i.e. the winner who also wins from the runner up (the alternative winner if the overall winner would not partake).

```
BordaFP[]
```

CU

CU (Gert-Jan Segers) would not only have most votes in a Borda vote but would also win in a (binary) duel from the PvdD (Marianne Thieme), where the PvdD would win if the CU would not partake.

Alternative to BFP: the current Plurality voting

Plurality selects the person with the highest vote - that might be less than 50%. All parties vote for their own candidate. Here VVD (Rutte) wins but has only 22% and much less than 50%. Thus the continuation of Mark Rutte as prime minister would not be self-evident.

```
Plurality[] // N
```

$$\left\{\text{Sum} \to \begin{pmatrix} \text{50Plus} & 0.0266667 \\ \text{CDA} & 0.126667 \\ \text{CU} & 0.0333333 \\ \text{D66} & 0.126667 \\ \text{DENK} & 0.02 \\ \text{FvD} & 0.0133333 \\ \text{GL} & 0.0933333 \\ \text{PvdA} & 0.06 \\ \text{PvdD} & 0.0333333 \\ \text{PVV} & 0.133333 \\ \text{SGP} & 0.02 \\ \text{SP} & 0.0933333 \\ \text{VVD} & 0.22 \end{pmatrix}, \text{Ordering} \to \begin{pmatrix} 0.0133333 & \text{FvD} \\ 0.02 & \text{DENK} \\ 0.02 & \text{SGP} \\ 0.0266667 & \text{50Plus} \\ 0.0333333 & \text{CU} \\ 0.0333333 & \text{PvdD} \\ 0.06 & \text{PvdA} \\ 0.0933333 & \text{GL} \\ 0.0933333 & \text{SP} \\ 0.126667 & \text{CDA} \\ 0.126667 & \text{D66} \\ 0.133333 & \text{PVV} \\ 0.22 & \text{VVD} \end{pmatrix}, \text{Max} \to \{\text{VVD}, 0.22\}, \text{Select} \to \{\}\right\}$$

Alternative to BFP: Borda selection

The Borda count merely sums the scores.

```
BordaAnalysis[] // N
```

$$\left\{\text{Select} \to \text{CU}, \text{BordaFPQ} \to \{\text{True}\}, \text{WeightTotal} \to \right.$$

$$\{7.42667, 8.88, 9.39333, 7.94, 1.24, 4.88, 7.47333, 8.68, 9.14667, 4.31333, 5.64667, 6.87333, 9.10667\},$$

$$\left.\text{Position} \to (\ 3.\ ), \text{Ordering} \to \begin{pmatrix} 1.24 & \text{DENK} \\ 4.31333 & \text{PVV} \\ 4.88 & \text{FvD} \\ 5.64667 & \text{SGP} \\ 6.87333 & \text{SP} \\ 7.42667 & \text{50Plus} \\ 7.47333 & \text{GL} \\ 7.94 & \text{D66} \\ 8.68 & \text{PvdA} \\ 8.88 & \text{CDA} \\ 9.10667 & \text{VVD} \\ 9.14667 & \text{PvdD} \\ 9.39333 & \text{CU} \end{pmatrix}\right\}$$

PM. This Borda ranking might allow a check on the overall spectrum.

Let us check that PvdD is the winneer if CU does not partake, and that CU wins from PvdD.

```
SelectPreferences[Drop, CU]
```

CheckVote::adj : NumberOfItems adjusted to 12

$$\left\{\text{Number of Voters} \to 13,\ \text{Number of items} \to 12,\ \text{Votes are nonnegative and add up to 1} \to \text{True},\right.$$

$$\text{Preferences fit the numbers of Voters and Items} \to \text{True},\ \text{Type of scale} \to \text{Ordinal},$$

$$\text{Preferences give a proper ordering} \to \text{True},\ \text{Preferences add up to} \to \{78\},$$

$$\text{Items} \to \{\text{50Plus}, \text{CDA}, \text{D66}, \text{DENK}, \text{FvD}, \text{GL}, \text{PvdA}, \text{PvdD}, \text{PVV}, \text{SGP}, \text{SP}, \text{VVD}\},$$

$$\left.\text{Votes} \to \left\{\frac{2}{75}, \frac{19}{150}, \frac{1}{30}, \frac{19}{150}, \frac{1}{50}, \frac{1}{75}, \frac{7}{75}, \frac{3}{50}, \frac{1}{30}, \frac{2}{15}, \frac{1}{50}, \frac{7}{75}, \frac{11}{50}\right\}\right\}$$

```
BordaFP[]
```

PvdD

```
VotingProblem["Restore"];
```

```
SelectPreferences[{CU, PvdD}];
```

CheckVote::adj : NumberOfItems adjusted to 2

```
Plurality[]
```

$$\left\{\text{Sum} \to \begin{pmatrix} \text{CU} & \frac{17}{30} \\ \text{PvdD} & \frac{13}{30} \end{pmatrix}, \text{Ordering} \to \begin{pmatrix} \frac{13}{30} & \text{PvdD} \\ \frac{17}{30} & \text{CU} \end{pmatrix}, \text{Max} \to \left\{\text{CU}, \frac{17}{30}\right\}, \text{Select} \to \text{CU}\right\}$$

```
VotingProblem["Restore"];
```

CU however would not win from Mark VVD (Rutte) in a pairwise contest (see below). In the past CU has also been a Condorcet winner, but not in 2017.

Alternative to BFP: Pairwise voting

It appears that the VVD is quite close to being the Condorcet winner - i.e. wins from all pairwise votes - except that there is a tie with 50Plus, such that there arises a cycle.

The Condorcet criterion however is not a strong one since there can be elections where there is no such winner, or a Condorcet winner might lose in a Borda approach.

There are now 13 * 12 / 2 = 78 of such pairwise votes and thus it is simplest when all Members of Parliament would enter a single preference list whereafter the algorithm determines the overall result.

PairwiseMajority[]

VoteMarginToPref::cyc : Cycle {VVD, 50Plus, CDA, CU, VVD}

VoteMarginToBinary::dif : Selection 50Plus differs from Condorcet winning VVD

$$\left\{\text{VoteMargin} \to \text{VoteMargin}\left(\begin{pmatrix} 0 & -\frac{1}{15} & -\frac{1}{15} & \frac{14}{75} & \frac{24}{25} & \frac{17}{75} & \frac{19}{75} & -\frac{61}{75} & -\frac{28}{75} & \frac{2}{3} & -\frac{1}{15} & -\frac{4}{75} & 0 \\ \frac{1}{15} & 0 & -\frac{6}{25} & \frac{2}{15} & \frac{24}{25} & \frac{53}{75} & \frac{2}{15} & \frac{2}{15} & \frac{2}{15} & \frac{53}{75} & \frac{23}{25} & \frac{2}{15} & -\frac{2}{75} \\ \frac{1}{15} & \frac{6}{25} & 0 & \frac{2}{15} & \frac{24}{25} & \frac{53}{75} & \frac{14}{75} & \frac{19}{75} & \frac{2}{15} & \frac{53}{75} & \frac{23}{25} & \frac{38}{75} & -\frac{2}{75} \\ -\frac{14}{75} & -\frac{2}{15} & -\frac{2}{15} & 0 & \frac{24}{25} & \frac{2}{3} & \frac{11}{75} & -\frac{3}{25} & -\frac{14}{75} & \frac{2}{3} & \frac{1}{3} & 0 & -\frac{2}{15} \\ -\frac{24}{25} & -\frac{24}{25} & -\frac{24}{25} & -\frac{24}{25} & 0 & -\frac{24}{25} & -\frac{24}{25} & -\frac{24}{25} & -\frac{24}{25} & -\frac{24}{25} & -\frac{24}{25} & -\frac{24}{25} & -\frac{24}{25} \\ -\frac{17}{75} & -\frac{53}{75} & -\frac{53}{75} & -\frac{2}{3} & \frac{24}{25} & 0 & -\frac{17}{75} & -\frac{17}{75} & -\frac{53}{75} & -\frac{8}{15} & -\frac{4}{15} & -\frac{17}{75} & -\frac{53}{75} \\ -\frac{19}{75} & -\frac{2}{15} & -\frac{14}{75} & -\frac{11}{75} & \frac{24}{25} & \frac{17}{75} & 0 & -\frac{14}{25} & -\frac{14}{75} & \frac{2}{3} & \frac{3}{25} & \frac{38}{75} & -\frac{1}{15} \\ \frac{61}{75} & -\frac{2}{15} & -\frac{19}{75} & \frac{3}{25} & \frac{24}{25} & \frac{17}{75} & \frac{14}{25} & 0 & -\frac{28}{75} & \frac{2}{3} & \frac{44}{75} & \frac{19}{75} & -\frac{1}{15} \\ \frac{28}{75} & -\frac{2}{15} & -\frac{2}{15} & \frac{14}{75} & \frac{24}{25} & \frac{53}{75} & \frac{14}{75} & \frac{28}{75} & 0 & \frac{53}{75} & \frac{64}{75} & \frac{14}{25} & -\frac{26}{75} \\ -\frac{2}{3} & -\frac{53}{75} & -\frac{53}{75} & -\frac{2}{3} & \frac{24}{25} & \frac{8}{15} & -\frac{2}{3} & -\frac{2}{3} & -\frac{53}{75} & 0 & -\frac{53}{75} & -\frac{2}{3} & -\frac{53}{75} \\ \frac{1}{15} & -\frac{23}{25} & -\frac{23}{25} & -\frac{1}{3} & \frac{24}{25} & \frac{4}{15} & -\frac{3}{25} & -\frac{44}{75} & -\frac{64}{75} & \frac{53}{75} & 0 & -\frac{3}{25} & -\frac{64}{75} \\ \frac{4}{75} & -\frac{2}{15} & -\frac{38}{75} & 0 & \frac{24}{25} & \frac{17}{75} & -\frac{38}{75} & -\frac{19}{75} & -\frac{14}{25} & \frac{2}{3} & \frac{3}{25} & 0 & -\frac{8}{25} \\ 0 & \frac{2}{75} & \frac{2}{75} & \frac{2}{15} & \frac{24}{25} & \frac{53}{75} & \frac{1}{15} & \frac{1}{15} & \frac{26}{75} & \frac{53}{75} & \frac{64}{75} & \frac{8}{25} & 0 \end{pmatrix}\right)\right\},$$

$1 \to \{\text{StatusQuo} \to \text{50Plus}, \text{Sum} \to \{6, 10, 11, 6, 0, 1, 5, 8, 9, 2, 4, 6, 12\}, \text{Max} \to 12, \text{Condorcet winner} \to \text{VVD},$
$\text{Pref} \to \text{Pref}(\text{DENK, FvD, PVV, } \{\text{50Plus, CDA, CU, D66, GL, PvdA, PvdD, SGP, SP, VVD}\}),$
$\text{Find} \to \{\text{50Plus, CDA, CU, D66, GL, PvdA, PvdD, SGP, SP, VVD}\}, \text{LastCycleTest} \to \text{True}, \text{Select} \to \text{50Plus}\},$

$$N \to \left\{\text{Sum} \to \left\{\frac{64}{75}, \frac{94}{25}, \frac{359}{75}, \frac{47}{25}, -\frac{288}{25}, -\frac{106}{25}, \frac{71}{75}, \frac{84}{25}, \frac{322}{75}, -\frac{403}{75}, -\frac{203}{75}, -\frac{19}{75}, \frac{316}{75}\right\},\right.$$
$$\left.\text{Pref} \to \text{Pref}(\text{DENK, PVV, FvD, SGP, SP, 50Plus, GL, D66, PvdA, CDA, VVD, PvdD, CU}),\right.$$
$$\left.\text{Select} \to \text{CU}\right\}, \text{All} \to \text{CU}\Big\}$$

PM. If pairwise comparisons do not generate a Condorcet winner, then we conclude to a deadlock, and that deadlock might be broken by persistence of the Status Quo (case 1 → ...) or by taking the item with the highest margin count (case N → ...).

An example pairwise vote: CU and VVD

Since VVD has the greatest number of seats its leader is conventionally regarded as the candidate to become Prime Minister. VVD however barely wins from CU in a pairwise vote.

SelectPreferences[{VVD, CU}];

CheckVote::adj : NumberOfItems adjusted to 2

Plurality[]

$$\left\{\text{Sum} \to \begin{pmatrix} \text{CU} & \frac{73}{150} \\ \text{VVD} & \frac{77}{150} \end{pmatrix}, \text{Ordering} \to \begin{pmatrix} \frac{73}{150} & \text{CU} \\ \frac{77}{150} & \text{VVD} \end{pmatrix}, \text{Max} \to \left\{\text{VVD}, \frac{77}{150}\right\}, \text{Select} \to \text{VVD}\right\}$$

VotingProblem["Restore"];

An example pairwise vote: VVD and 50Plus

There is a tie between VVD and 50Plus.

```
SelectPreferences[{VVD, "50Plus"}];
```

CheckVote::adj : NumberOfItems adjusted to 2

```
Plurality[]
```

$$\left\{\text{Sum} \to \begin{pmatrix} \text{50Plus} & \frac{1}{2} \\ \text{VVD} & \frac{1}{2} \end{pmatrix}, \text{Ordering} \to \begin{pmatrix} \frac{1}{2} & \text{50Plus} \\ \frac{1}{2} & \text{VVD} \end{pmatrix}, \text{Max} \to \left\{\{\text{50Plus}, \text{VVD}\}, \frac{1}{2}\right\}, \text{Select} \to \{\}\right\}$$

```
VotingProblem["Restore"];
```

An example pairwise vote: CU and CDA

CDA claimed during the 2017 elections that it might generate the prime minister. The following example shows that the candidate of the CU would win from the candidate of the CDA in a pairwise vote.

```
SelectPreferences[{CDA, CU}]
```

CheckVote::adj : NumberOfItems adjusted to 2

$$\left\{\text{Number of Voters} \to 13,\ \text{Number of items} \to 2,\ \text{Votes are nonnegative and add up to 1} \to \text{True},\right.$$
$$\text{Preferences fit the numbers of Voters and Items} \to \text{True},\ \text{Type of scale} \to \text{Ordinal},$$
$$\text{Preferences give a proper ordering} \to \text{True},\ \text{Preferences add up to} \to \{3\},\ \text{Items} \to \{\text{CDA}, \text{CU}\},$$
$$\left.\text{Votes} \to \left\{\frac{2}{75}, \frac{19}{150}, \frac{1}{30}, \frac{19}{150}, \frac{1}{50}, \frac{1}{75}, \frac{7}{75}, \frac{3}{50}, \frac{1}{30}, \frac{2}{15}, \frac{1}{50}, \frac{7}{75}, \frac{11}{50}\right\}\right\}$$

```
Plurality[]
```

$$\left\{\text{Sum} \to \begin{pmatrix} \text{CDA} & \frac{19}{50} \\ \text{CU} & \frac{31}{50} \end{pmatrix}, \text{Ordering} \to \begin{pmatrix} \frac{19}{50} & \text{CDA} \\ \frac{31}{50} & \text{CU} \end{pmatrix}, \text{Max} \to \left\{\text{CU}, \frac{31}{50}\right\}, \text{Select} \to \text{CU}\right\}$$

```
VotingProblem["Restore"];
```

Conclusion

The current Dutch convention of appointing the Prime Minister by means of Plurality originates in political practice and hence has a firm empirical base. It is a somewhat daring thought to test, clarify and enhance the political base of a potential Prime Minister by using more sophisticated techniques. The challence is shown by the difference between the conventional outcome of VVD with 33 seats and the Borda Fixed Point outcome of CU with 5 seats, all in a House of Commons with 150 seats. The conventional approach uses only limited information (the top preference) and the sophisticated method uses whole rankings and a test on stability. The conventional approach has the advantage that it has been used over the last century but perhaps that century also shows its drawbacks.

The role of the Prime Minister is to be above the parties, to be there for all citizens, to manage the decision making process, and to clarify government policy. Frequently there is a "Prime Minister bonus" at the polls caused by the phenomenon that many voters appreciate this role so that the

Prime Minister in function gets more votes than would normally be the case. The position of Prime Minister tends to be a politically desirable goal. It provides a position to also implement specific political goals under the umbrella (or perhaps guise) of the common cause. The original function can be enhanced when the selection is somewhat separated from the bargaining process.

The current convention in Holland is to target a coalition with minimal majority and to select the Prime Minister with Plurality in that coalition. This thus finds a challenge in the better and likely optimal approach of both mirroring the House and selecting the Prime Minister with the widest political base (as indicated by the Borda Fixed Point method).

These findings for Holland support an earlier suggestion that also the US and UK and France move towards PR and that the US and France move to the selection of their Presidents by Parliament rather than by direct elections.

Appendix A: Strategic voting

Strategic voting can never be fully avoided.

VVD might give its competitors CU and PvdD much less weight and then it indeed succeeds in toppling them.

In the above:

```
Pref[VVD] = {VVD > CDA > CU > D66 >
     PvdD  > FvD > PvdA > SGP > "50Plus" > GL > SP > PVV > DENK};
```

Now changes into:

```
Pref[VVD] = {VVD > D66 > CDA > FvD >
     PvdA > SGP > "50Plus" > GL > SP > PVV > DENK > PvdD  > CU};
```

```
Preferences = PrefToList[ToPref @@ Pref[#]] &  /@ Items;
```

```
BordaFP[]
```

BordaFP::chg : Borda gave {PvdA}, the selected Fixed Point is {VVD}

VVD

```
BordaAnalysis[] // N
```

$$\left\{\text{Select} \to \text{PvdA},\ \text{BordaFPQ} \to \{\text{False}\},\ \text{WeightTotal} \to \{7.86667, 8.66, 7.19333, 8.38, 1.68, 5.32, 7.91333, 9.12, 7.60667, 4.75333, 6.08667, 7.31333, 9.10667\},\right.$$

$$\left.\text{Position} \to (\ 8.\ ),\ \text{Ordering} \to \begin{pmatrix} 1.68 & \text{DENK} \\ 4.75333 & \text{PVV} \\ 5.32 & \text{FvD} \\ 6.08667 & \text{SGP} \\ 7.19333 & \text{CU} \\ 7.31333 & \text{SP} \\ 7.60667 & \text{PvdD} \\ 7.86667 & \text{50Plus} \\ 7.91333 & \text{GL} \\ 8.38 & \text{D66} \\ 8.66 & \text{CDA} \\ 9.10667 & \text{VVD} \\ 9.12 & \text{PvdA} \end{pmatrix}\right\}$$

```
VotingProblem["Restore"];
```

However, other parties might anticipate such VVD strategic voting behaviour and they might respond by entering CU much higher in their preferences. Then the CU indeed is restored in its top position. Of course, other parties may also see strategies by other parties and hence adapt other scores, which creates a complex whole.

There is no need to show this further obvious point with a numerical example.

A way to reduce strategic voting is to publish the votes, so that parties may have some explaining to do. A secret ballot would hold for the individual voter in the ballot box but not necessarily for voting by Members of Parliament on the Prime Minister. Such open statements of preference do not exclude strategic voting but they do somewhat reduce it. The element of strategy would be reduced even more when preference orderings are announced before the national elections so that there is less room for tinkering after the elections.

Overall, the political discussion and the selection of the Prime Minister of the coalition cabinet would seem more sophisticated when using orderings and the Borda Fixed Point method than merely taking the leader of the largest party. It would also be advisable to have the government mirror the distribution in Parliament, since one would need a good argument to exclude a party with say 5% of the votes from partaking in government. Party programs may also become a bit more realistic when parties have experience in government (though practice does not show this necessarily).

Appendix B: The Senate

The Dutch Senate has 75 seats and has been elected at another moment so that the distribution of seats is not the same. Thus 38 seats are required for a majority in the Senate.

```
Senate =
 {{CDA, 12}, {CU, 3}, {D66, 10}, {GL, 4}, {PvdA, 8}, {PvdD, 2}, {PVV, 9},
 {SGP, 2}, {SP, 9}, {VVD, 13}, {"50Plus", 2}, {OSF, 1}} // Sort
```

50Plus	2
CDA	12
CU	3
D66	10
GL	4
OSF	1
PvdA	8
PvdD	2
PVV	9
SGP	2
SP	9
VVD	13

```
spectrumRelevant2 =
  {SP, GL, PvdA, D66, PvdD , CU, OSF, CDA, VVD,  SGP, "50Plus", PVV};
```

Restricting possible coalitions along this line:

```
coalssenate = MinimalCoalitions[Senate, spectrumRelevant2]
```

{SP, GL, PvdA, D66, PvdD, CU, OSF, CDA}	49
{GL, PvdA, D66, PvdD, CU, OSF, CDA}	40
{PvdA, D66, PvdD, CU, OSF, CDA, VVD}	49
{D66, PvdD, CU, OSF, CDA, VVD}	41
{PvdD, CU, OSF, CDA, VVD, SGP, 50Plus, PVV}	44
{CU, OSF, CDA, VVD, SGP, 50Plus, PVV}	42
{OSF, CDA, VVD, SGP, 50Plus, PVV}	39
{CDA, VVD, SGP, 50Plus, PVV}	38

It follows that the 1st (SP to CDA), 2nd (GL to VVD) and 3rd (PvdA to VVD) coalitions have dual majorities in the House and the Senate.

Thus it is the CDA that determines whether there will be a leftist or rightist type of government. The CDA can claim the Prime Minister from the parties on the left, since this is the only way how they would be able to govern closer to their own agenda.

```
{coalshouse, coalssenate}
```

{SP, GL, PvdA, D66, PvdD, CU, CDA}	85
{GL, PvdA, D66, PvdD, CU, CDA, VVD}	104
{PvdA, D66, PvdD, CU, CDA, VVD}	90
{D66, PvdD, CU, CDA, VVD}	81
{PvdD, CU, CDA, VVD, FvD, SGP, 50Plus, PVV}	91
{CU, CDA, VVD, FvD, SGP, 50Plus, PVV}	86
{CDA, VVD, FvD, SGP, 50Plus, PVV}	81

,

{SP, GL, PvdA, D66, PvdD, CU, OSF, CDA}	49
{GL, PvdA, D66, PvdD, CU, OSF, CDA}	40
{PvdA, D66, PvdD, CU, OSF, CDA, VVD}	49
{D66, PvdD, CU, OSF, CDA, VVD}	41
{PvdD, CU, OSF, CDA, VVD, SGP, 50Plus, PVV}	44
{CU, OSF, CDA, VVD, SGP, 50Plus, PVV}	42
{OSF, CDA, VVD, SGP, 50Plus, PVV}	39
{CDA, VVD, SGP, 50Plus, PVV}	38

This reasoning still is within the context of trying to form a minimal coalition of 50% + 1. The alternative approach in “Voting Theory for Democracy” is to mirror parliament into government, so that also smaller parties may partake in government responsibility and achieve political maturity. It is a somewhat undemocratic and misleading populist manoeuvre to use the opposition benches to bounce back into power (as CDA actually did in 2012). It is better to show what you are up to in government, and minority parties should have a chance to do so too. The Greens could be involved in greening the economy, 50Plus could try to improve the position of the elderly, and so on, all within the limits of tolerance of the other parties in Parliament, but for smart proposals these limits of tolerance can be ample. The former coalition of VVD & PvdA also had to shop around to find a majority in the Senate, so that principle of shopping applies in any case.

Appendix C: Swings in positions versus stability

Colignatus (2012) showed various swings in political positions. Namely: (1) The fall of the original VVD & CDA & PVV coalition that caused the September elections, (2) GL moving from left to right to left again, (3) PvdA from contra to pro an application of the EU 3% deficit rule, (4) PvdA from contra to pro Rutte as Prime Minister, (5) VVD from contra to pro PvdA in government, (6) CDA from pro to

contra participation in government überhaupt, (7) 50Plus with the split-up with OSF. (8) An important example is that Mark Rutte as incumbent Prime Minister and candidate for re-election promised that no new money would go to Greece. However, every serious analyst knew that the resolution of the Greek debt would require another round of bailouts. This indeed happened after the September 12 elections, namely at the end of November, see BBC (2012). Thus, the Dutch Prime Minister either didn't know what he was talking about or told an election lie and gave a false promise. In 2016, Rutte offered some kind of apologies for “breaking” his promises, see RTLNieuws (2016), but he did not acknowledge that these had been false promises.

In the 2017 elections, the number of curious swings was a bit less but still quite noticeable. (1) Most curious has been that the “opposition” parties collaborated with the “governing” parties VVD & PvdA in order to achieve a majority in the Senate. It is not clear why there were no new coalition talks so that also these “opposition” parties were included in the cabinet. (2) Diederik Samsom (PvdA, Labour) had started the VVD & PvdA coalition in 2012, and was ousted and not granted the opportunity to defend his choice. He was replaced by Lodewijk Asscher, who implied that the VVD & PvdA coalition had been regrettable, even though he himself had been its vice-premier. Apparently he only discovered this at the end of the term of four years, and in the course of a leadership contest. Instead of defending what his party had achieved, Asscher indicated that he regretted it, see Hendrickx (2016). One can imagine the plunge from 38 seats in 2012 to 9 seats in 2017. (3) Curiously, PvdA voters who shifted to D66, did so often because of the constructive attitude of D66, but these voters apparently did not realise that they were abandoning the real mccoy that D66 was constructing with. (4) Stability can also have a downside. Asscher promotes his law “Wet Werk en Zekerheid” (WWZ) that forces employers to offer fixed term contracts to new employees. It had been forecasted by economists that this law will have the opposite effect, since employers cannot afford the costs of fixed contracts and then fire employees who might fall under that law. It is curious that Asscher pushed for this law even given these warnings, but apparently he was desperate for some window dressing to claim that he had done something “socially”. This prognosis has been corroborated by the facts now that this law is into effect. Asscher denies these facts, and stated that he would not be in a coalition with VVD if they want to adapt his law. (5) Henk Krol (50Plus) first stated that the financial means were available to reduce the retirement age to 65, but then it was discovered that these finances were generated by lowering the pensions for all pensioners. The party leadership blocked this measure, but maintained the reduction of the retirement age, apparently increasing the national deficit.

This swinging affects the bargaining process too. This swinging or switching isn’t merely without principle. A party may adopt a policy that goes against its fundamental principles, which creates an internal instability that later erupts into much ado.

Overall, it would be wise for parties to try to limit swinging or switching. An investment in better policy analysis would help. An Economic Supreme Court would eliminate much political nonsense, see Colignatus (2000, 2005, 2011) (DRGTPE), so that political heat dissolves under scientific scrutiny, and so that the real political choices appear to be different from what is commonly thought.

Subsequently, we return to the suggestion that the government better mirrors Parliament. A greater respect for what democracy means would help. Democracy is not merely the will of the majority but an eye for minority rights. A person is mostly a minority and perhaps only a majority in some cases. It is actually nice to see that the popular sentiment with the increasing dispersion of views already encourages politicians to think along those lines.

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